

Antenna Alignment on the Maritime VSATs

Over last years the SatCom industry has grown significantly on the maritime sector, forced by a significant increase bandwidth on global coverage demand. In order to fulfill customer requirement new satellites are being launch with much higher capabilities. High throughput satellites (HTS) bring unlimited possibilities for satellite service providers; which requires throughput and faster broadband connectivity.

Currently, emerging HTS satellite operators are going to provide this new satellites capacity with a global coverage. So an evolution is coming for the VSAT industry on the maritime segment providing passenger and crew a much better experience for browsing, skipping and downloading.

Passengers on cruises are demanding high speed internet connectivity for video and audio applications which consumes a lot of broadband therefore each day a much faster connectivity is required. This new applications have to coexist with the ship systems which requires connectivity.

VSAT antennas are automatically pointed to the right satellite based on the GPS position, and accurate antenna tracking. This allows an accurate antenna pointing while the ship is moving. Nevertheless, these antennas prior to be operational should be line-up and commissioned by a certified satcom field engineer, which has to travel long distance to a given port on tight schedule and arrange a call with the NOC. This process is very time consuming and labor intensive.

Additionally, maritime antennas usually create cross pol interference as the ship moves through the globe and the antenna matrix is not correctly aligned with the satellite polarization. So most of the times, the satcom installer must travel to a given port to solve this issue, being very expensive as the ship stops at the port for a given time slot. Also as the maritime dishes are small, the transmission of these dishes creates a wider beamwidth which may affect the satellites close in angle from the target satellite, creating ASI (Adjacent Satellite Interference).

Integrasys has developed the right tool for enabling crew members to point peak and pol while interferences are minimized rapidly. Targeting that no more Satcom field experts are needed, just Satmotion Pocket which guides the crew member on the line up for a proper alignment on the right satellite and pol, without the need to arrange a call or certified installer presence.



Line-up is measured at the hub with Satmotion server, measuring Copol, CrossPol and ASI simultaneously and displaying the measurements at the ship in a very intuitive way, for crew understanding. The crew should have access to antenna control unit for fine tuning. By controlling and guiding the crew, the line-up is managed and reported to the hub without the need of third party personnel at the ship or schedule any call with hub and NOC operators.

This brings a significant cost savings on the certified field engineer fees, travel expenses, ship delays, passenger experience, and interference penalties.



Nowadays, most of the stabilized maritime antennas use an open loop approach to align the linear polarization axis to that of the wanted satellite, continuously computing and adjusting the required angle according to current ship position and orientation. In order to maintain a high alignment accuracy, this process requires low-drift and high-sensitivity inertial sensors and mechanical components, namely feed rotors and positioners. Inadequate polarization alignment limits pointing tracking accuracy as well as signal acquisition range and speed; eventually resulting into loss of the tracking signal, which usually leads to stop VSAT transmission and start a rather long initialization procedure. In order to provide proper protection from open-loop polarization errors, preventing intra and inter system interferences, the transmitted power is proportionally backed-off, resulting in turns into a decrease of the usable bitrate.

Similarly to fixed VSATs, the critical signal direction for polarization alignment in stabilized VSATS keeps being the uplink path. Achieving high accuracy levels by means of an open-loop adjustment approach requires not only high-quality electronic and mechanical components as mentioned above. A second and equally important requirement is the need to perform an initial, accurate polarization alignment over the intended satellite. This is realized with a traditional clean-wave line-up procedure which effectively compensates all of the mechanical and electrical offsets in the end-to-end chain, providing an optimum starting point for the open loop algorithm with minimum error. This line-up process must be performed for every target satellite to be used by a given VSAT and must be periodically repeated as maintenance action to account for VSAT components degradation or replacements which are recurrent in the harsh maritime scenario. Line-up polarization adjustment is typically carried out by external qualified installers, being it docked on port when possible, as some satellites may be properly visible only in open seas. The lack of a high-quality uplink polarization initialization for a given satellite with regular cross-polarization requirements usually prevents the VSAT from using such satellite.

Today Satmotion customers benefit from on the line-up, using the right pol by the crew members, fully independent, minimizing the time which the service is down and maximizing the VSAT performance after the lineup is finished successfully.

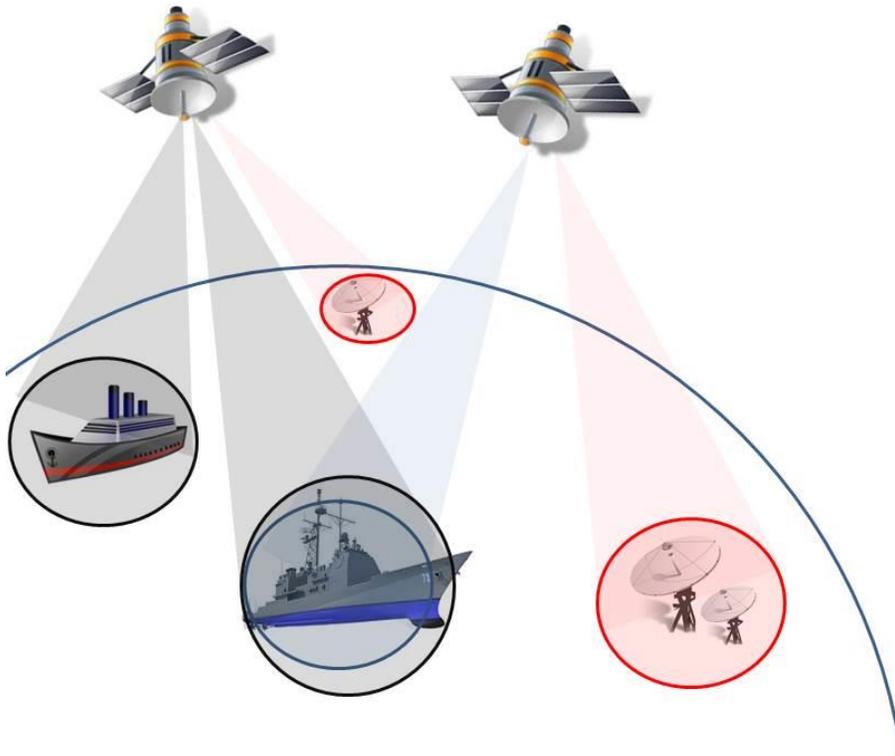


Figure 1, Satellite & Beam Roaming

Currently Integrasys is studying the possibility of integrating Satmotion functions on the Antenna Control Unit (ACU) for minimizing crosspol and ASI while the ship is moving and changing from one satellite to another automatically without any possible issues. Therefore no more crew involvement will be required, and fully maritime automated system will be achieved. The procedure would involve both the ACU and the satellite modem of the VSAT and would enable the possibility to run automated uplink polarization adjustment procedures on-demand, e.g. as part of the acquisition process of a given satellite, procuring optimum performance in terms of tracking, interference reduction and power-to-bandwidth efficiency.

Currently iDirect has upgraded their product line to iDX 3.2 software release allowing maritime service providers to experience “powerful capabilities in some of the most demanding environments” for providing customers with “better quality, more resilient service at higher performance” and Integrasys actively works with iDirect on iDX 3.2 to help their customers for much more reliable communication at sea.